

and beyond this is a conspicuous pearly-grey fringe. The hindwings are grey, faintly tinged with rose colour towards the anal angle and inner margin, and with several dark and pale indistinct transverse wavy lines, and with the black hind marginal line and pearly-grey fringe as in the forewings. Of course, the chief character of this aberration is the conspicuous pearly-grey fringe, which is absent in typical examples.

(2) *C. fluvicata* ab. *olivacea*, n. ab.—In this aberration, which is rare, and seems to occur only among the females, the purple-brown of the forewings is replaced by olive-brown, but all the other characters are the same as in typical specimens. I have, however, two examples of this aberration which possess the conspicuous pearly-grey fringe characteristic of ab. *marginata*, but do not think it necessary to give them a varietal name.

(3) *C. fluvicata* ab. *obsoleta*, n. ab.—In this aberration, which is confined to the males, the dark median band is nearly obsolete, or altogether absent.

With reference to my query at the beginning of this paper, as to the retiring habits of this species, I may mention that, on several occasions when removing bred moths from the breeding-cages, some of them have escaped, but instead of flying towards the window, as most Geometers do, or to the ceiling, they almost always fluttered low and gently downwards, and hid themselves beneath a table or in some dark corner of the room. The one I found in the daytime in High Street, Dovercourt, was sitting on the wall within an inch of the ground.

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### Contribution to the life-history of *Heliothis peltigera*.

By ALFRED SICH, F.E.S.

On July 13th, 1906, Mr. Eustace R. Bankes took, in the Isle of Purbeck, a ♀ *Heliothis peltigera*, and subsequently obtained ova, one of which, and the larva produced from it, owing to the kindness of Mr. Bankes, form the subject of these notes.

OVUM.—Upright, conoid, bluntly rounded towards the top, with the apex itself containing a depression in its centre, raised above the general surface. Height, 0.52mm. Diameter, at the base, 0.5mm., at the top, 0.23mm. Basal outline not regular. Sculpture: the shell is very finely pitted; there are about 35 primary ribs, which are reduced in number as they approach the micropylar area, where they are but fifteen. These ribs are irregular, rather thick (0.016mm.), somewhat keeled. They decrease by running into each other, or by ceasing more or less abruptly. The interspaces between the ribs are about equal in width to the breadth of the ribs. About twenty weak wrinkles encircle the egg, more defined towards the base and summit. The micropyle lies at the summit, on an elevation, down the upper slopes of which the cells of the neat and conspicuous rosette extend. The apex of this elevation is depressed, and, in the centre of the depression, is a raised point, from which the twelve elongated kite-shape cells of the rosette radiate. These cells vary much in length, the longest being 0.05mm. and the shortest about half that length. [Described, July 18th, 1906, from a single ovum, just before hatching. The black head of the larva and its yellow body were distinctly visible through the thin, almost colourless, eggshell. On hatching, the larva cut a hole in the wall of the egg near the summit, but left the shell otherwise uneaten.]

HABITS OF LARVA.—After hatching, the slender, pale yellow, larva hid itself in the flower-head of *Trifolium repens*, with which it was supplied, boring into the florets. It appeared particularly fond of the anthers. It hatched on July 18th, and, on the morning of the 22nd, it had spun a

few threads of white silk, forming a weak platform on which it rested to undergo its first ecdysis. The next morning it was already in its second instar. It fed in the same manner, but ate the filaments of the stamens, and more of the corolla than previously. On the 25th, the larva was again stretched out on a slight layer of silk, and, by the 26th, had assumed the third instar. Two days later it was again laid up, and appeared in the fourth instar on the 29th. On the 31st, a fourth platform had been spun, and the fifth instar was assumed on August 1st. Two days later the larva was again undergoing ecdysis, and it appeared in its sixth and last instar on August 4th. At every change it ate the cast skin. This stadium naturally lasted a longer period than those preceding it, but, on August 8th, the umber markings on the larva became pink, and, on the 9th, the larva was more or less suffused with pink, and went down into earth that evening. About a fortnight later the slender, bright brown, pupa was dug up. It was found, in a rather brittle cocoon, about  $1\frac{1}{2}$  inches below the surface. The moth, a ♂, was found with fully expanded wings, resting on the top of the box, September 3rd, 1906. Thus, in  $46\frac{1}{2}$  days, the insect developed from ovum to imago. The weather, during this period, was, on the whole, extremely favourable to rapid development. In its later stadia, the larva still confined itself entirely to the blossoms of the clover, never eating the leaves. It rested usually outstretched among the clover flowers, but with head and prothorax bent downwards. It never attempted to spin the blossoms together, or to conceal itself in any way. It was very sensitive to touch, and moved rapidly if annoyed, but otherwise appeared to be rather of a sluggish disposition. When crawling, even in its first stadium, it used all the ventral prolegs, not in any way half-looping as many small Noctuid larvae are in the habit of doing.

*LARVA.—First instar:* Length 2.4mm. Width of head 0.28mm. Head small, black, rather rounded in outline, notched on the crown. Body long, slender, pale yellow, covered with black spicules. Segmental divisions well marked. Spiracles large, black-ringed, rather raised. Thoracic legs dark grey, with white rings. Ventral prolegs long and slender, dark grey. Tubercles black, situated on a large dark grey plate, each carrying one black hair, with a slightly swollen grey apex. Prothorax wider than the head; the deep brown shield carries an anterior and a posterior row of four hairs, the anterior row being the larger. Below the shield, on a common plate, are two tubercles, the front one with a longer curved hair, directed obliquely forwards, the other with a hair about half the length. Below this is the large, much-elevated, spiracle, in front of which is a tubercle with a long straight hair pointing forwards and outwards, and a small tubercle with a very short hair; both these are on a common plate. Again, below these, are two tubercles with equally long hairs, on a common dark grey plate. On the meso- and metathorax, i, ii, iii, iv, and v form an oblique transverse line, v being the anterior. Below v is another tubercle with a long hair, and there are two hairs at the base of each leg. On the abdominal segments, i, ii, and iii are in the usual positions; iv lies behind the spiracle, and v below the spiracle. Lower down is a smaller tubercle and hair, which may be either vi or vii. The anal shield is dark brown, with eight black bristles. *Second instar:* Length 4mm., width of head 0.5mm. Head black, with a few scattered hairs, otherwise smooth and shining. Body slender,

pale ochreous in colour, the dorsal vessel appearing as a dark grey line. There is a slender, pale, subdorsal line, and traces of a pale subspiracular. The prothoracic shield is ochreous-brown; the anal shield is small. There is a dark patch at the base of the anal claspers. The body is covered with blunt black spicules, rather more numerous than in the first instar. On the prothorax, the two tubercles, on a common plate situated just below the shield, carry hairs of more equal length than in the first instar. Both meso- and metathorax have now two, or rather four, additional tubercles, two on each side of the larva. One is situated between, and behind, iv and v, with a rather short hair, and the other, smaller, is just below v. The hairs of both these are pointed. The primary tubercles arise from large brown plates; they are black, and well raised, and carry one hair slightly swollen at the apex, the basal two-thirds black, and the apical third grey or whitish. The length of these hairs, on tubercles i, ii, and iii, is about 0.17mm., on iv and v about half that length. *Third instar:* Length 6.6mm.; width of head 0.66mm. Head and thoracic legs black. Ground colour of the body pale yellowish-grey. Dorsal stripe broad, dark grey, bordered on each side by a series of pale dots. Pale whitish subdorsal and spiracular stripes. Abdominal prolegs very dark grey. Anal claspers yellowish, with basal marks black. Anal shield with a blackish border. Spiracles black-rimmed, rather raised, and surrounded by a brownish plate. There is a strong whitish flange. There are four subsegments on the meso- and metathorax; all the primary tubercles are on the third subsegment. The abdominal segments appear to have also four subsegments. The second subsegment carries i, iii, and the spiracle, while tubercle ii is on the third subsegment. Prothoracic shield somewhat quadrate, yellowish; lateral and posterior borders edged with black. Down the centre are three pairs of black marks; on the anterior border are four black tubercles, each bearing one long white hair, and on the posterior are also four black tubercles, each with a shorter dark hair. The primary tubercles are on very large raised plates (0.10mm. in diameter), practically colourless, but with an irregular black border; the tubercles are black, surmounted by a whitish hair, bluntly pointed at the apex. The hairs of i and iii measure 0.3mm., and that of ii 0.4mm. The additional tubercles on the meso- and metathorax, as described in the account of the second instar, have dark pointed hairs. In this third instar the black spicules, covering the larval skin, are rather more numerous than in the second instar, and they vary much in size. Some of them, especially numerous on the subdorsal area, have developed into secondary skin-hairs, and consist of a small black tubercular point, with a very short, stout, pointed spine at the apex, the tubercle and spine together measuring 0.03mm. The most curious feature, however, in this instar, is the presence on the skin of short (also about 0.03mm.) white truncated rods. These appear to rise directly from the skin, without any kind of tubercular base, but the area immediately around them is devoid of spicules, as it is around the bases of the primary tubercles. These points are situated chiefly on each side of the dorsal stripe; they also form the white borders of the subdorsal stripe, and are scattered also over the dorsal and spiracular areas. *Fourth instar:* Length 11mm. Head narrower than the prothorax, black, much marbled with ochreous on the face. Body slender, slightly flattened on the dorsum; segmental

divisions well marked; subsegmental divisions not well marked. Legs and claspers moderate in length. In general, the larva has a somewhat shagreened appearance. The dorsal and subdorsal areas of the body are yellowish-green; the broad mediodorsal stripe dark greyish-green, with numerous white dots, and more or less bordered with pale spots, each with a short, white, point in the centre. Close to the mediodorsal stripe is tubercle i, and, lower down, ii. In this subdorsal area are many pale spots and points, irregularly placed. Just below ii, runs the narrow, conspicuously pale, subdorsal line, composed of pale spots with a point in the centre of each. The area between this line and the very strong white flange is dark greyish-green, like the mediodorsal stripe, with several, scattered, white points. Here is tubercle iii, and, below it, the small, black, spiracle. Just above the flange, and behind the spiracle, lies iv, while v is situated on the flange, and is subspiracular. The area below the flange is dark greyish-green as are the anal claspers and ventral prolegs, the latter having an ochreous pad and a row of sixteen reddish-ochreous crotchets. The thoracic legs are black, with ochreous bands. The meso- and metathorax have five subsegments, the tubercles occurring on the third; the fourth and fifth subsegments are very narrow. The abdominal segments, typically, also have five subsegments, the first very wide, and the second and fifth very narrow. The primary tubercles much the same as before, but the long white hair is attenuated to a blunt point. The length of the hair on i is about 0.65mm., that on ii, 0.7mm.; iv and v carry hairs about 0.34mm. in length, while iii and vi (as I am inclined to call it) have hairs about 0.6mm. There is a small tubercle, with a short hair, on the prolegs. On the 8th abdominal segment, the trapezoidal tubercles (i and ii) form a square, and on the 9th abdominal an inverse trapezoid, that is, the two tubercles i are further apart than the two tubercles ii. The somewhat diamond-shaped anal shield is of the ground colour and inconspicuous; it carries an anterior and a posterior row of four hairs, in this respect like the prothoracic shield. Except round the bases of the tubercles, the white points, and the spiracles, the skin is covered with shining, black, spicules, which vary much in size. Those which are still simply spicules, are smooth at the apex, on the upper parts of the larva, but sharply-pointed on the venter. They vary much in the state of development from the merest, microscopic, black dot, through the sharply-pointed spicule, up to the small, dark grey, tubercular with a short black point at its summit. The curious white points mentioned in the account of the third instar, have now developed further. They rise from a very small, scarcely perceptible, plate, which runs round their bases as a border. They are rather swollen at the base, and terminate in either a truncated or a pointed apex. They are about 0.5mm. in height, very stout, and snow-white in colour. They are more numerous on the upper parts of the larva than on the parts below the lateral flange. *Fifth instar*: Length 21mm. Width of head 1.7mm. Head small, partly retractile into the prothorax, which, however, is not very wide, the colour is pale ochreous-grey, spotted on the crown with ochreous-brown. Body slender, cylindrical, though slightly flattened on the back. The pale longitudinal stripes give the larva the appearance as if it were much flattened on the back and sides. The flange is very strong, white, commencing on the prothorax, just below the spiracle, and terminating on the 10th

abdominal segment at the base of the anal claspers. Ground colour of the body light green, with a yellow tinge. Mediodorsal stripe dark greyish-green, bordered by large, pale, whitish spots, most conspicuous at the junctions of the segments. Subdorsal line composed of five or six pale, yellowish-white, oblong spots; this line is bent up at an angle on the 8th abdominal segment, forming a conspicuous whitish spot just below tubercle ii. Below this line the lateral area is dark greyish-green, becoming lighter green as the flange is approached. There are here, on each segment, one or two conspicuous pale spots, but their position is not constant. The spiracles are black-ringed. Below the flange is a subventral stripe, conspicuous as an oblique stripe running, over the anterior position of each segment, upwards to the base of the claspers. On the 1st and 2nd abdominal segments is a pale, rather faint, medioventral line. The tubercles, and secondary hair-clothing, are very similar to those of the fourth instar, except that the white points are much more numerous, and many of them reach a length of nearly 0.08mm. I think it was in this instar that I first noticed the presence, on the larva, of those peculiar, very small, tubercles, which often occur in larvæ in front of the spiracle and on the anterior portion of the segments. *Sixth instar*: Length 27mm. The larva is of the same shape, and proportions, as in the fifth instar. Ground colour pale green, with a slightly mealy appearance, on account of the numerous white points. The mediodorsal stripe, which runs uninterruptedly from the anterior of the mesothorax to the centre of the 1st abdominal segment, is black, but, owing to the numerous pale points contained in it, it looks olive to the unaided eye. On the abdominal segments this stripe is interrupted, being quite absent on the 2nd and 3rd subsegments. It is altogether absent on the 9th and 10th abdominal segments. The pale subdorsal line is traceable on the 1st, 2nd, and 3rd subsegments, but conspicuous on the 4th and 5th. The very dark broad stripe below this is constant on all the subsegments. The flange is, comparatively, not nearly so heavy as in the fifth instar, nor is it so white, as it becomes pinkish on the 7th, 8th and 9th abdominal segments. The space between the mediodorsal stripe and the flange is occupied alternately by transverse bands of green and rich umber with a pinkish hue, though on the 7th, 8th and 9th abdominal segments, this space is almost entirely umber. The spiracles, which are brownish-grey, with a black ring, are surrounded by a pale space. Beneath the flange the larva is green, but the flange is bordered below, at the centre of each segment, where tubercle v arises, with umber, and there is a patch of the same colour lower down. The prothoracic shield is brownish-green, not well marked, and there are still only four hairs on the anterior and posterior borders. Below the shield is a tubercle of ordinary size, with a very small tubercle below. Then follows the large, oval, black-ringed spiracle, with a very small, dark, hair in front of it, and a large tubercle further in front. Below the flange are two moderate-sized tubercles. The mesothorax has five subsegments; all the tubercles are on the large 3rd subsegment; i, ii, and iii are close together, in a transverse line, iv is rather further back. Between iii and iv is a small accessory tubercle; v is well forward on the flange, and just above v is a large accessory tubercle with a white hair. Further down is another large tubercle. The metathorax agrees with the mesothorax.

The typical abdominal segments have also five subsegments, but they are not all well-marked. The division between the 1st and 2nd is marked by a pair of green depressions, placed transversely, just behind the two tubercles i. Tubercle i is on the 1st subsegment, tubercle iii, the spiracle, and tubercle v on the 2nd subsegment, while ii and iv are on the 3rd subsegment. Above the proleg is tubercle vi (or vii). On the 8th abdominal segment, as in the fifth instar, the trapezoidals form almost a square, and on the 9th a reversed trapezoid. The anal flap is greenish, and has two tubercles in the centre, and a row of six on its border. There are four tubercles on the anal claspers. The primary tubercles have long white hairs in this instar, and the secondary small tubercles are mostly brown, except on the dark areas of the larva, where they are still black, as on the dorsal stripe, etc. The white points are still more numerous and conspicuous than before, some being 0.07mm. wide at the base, and 0.1mm. high. Perhaps the most conspicuous of these are situated as a pair in front of tubercle i, and three, forming a triangle, on the inner side of tubercle ii. These points are very wide at the base, and taper rapidly to a fine point.

### Myrmecophilous notes for 1906.

By H. St. J. K. DONISTHORPE, F.Z.S., F.E.S.

Having had a very successful year with ants' nest species, the following notes deal with the more interesting captures, and record new localities for others.

COLEOPTERA.—*Thiasophila inquilina*, Märk.—I have, this year, taken a dozen of this very rare species, with *Lasius fuliginosus*, at Wellington College. I have only found it in the very heart of the nests, and from the deepest packing; Dr. Joy tells me this was always his experience. I kept some specimens alive to experiment with, and they were found to protect themselves in the usual way, which I have demonstrated (*Ent. Record*, 1901, p. 349, and 1903, p. 11) other myrmecophilous "staphs" use, when attacked, against the ants. They were tested with *Formica rufa*, *F. exsecta*, and their own hosts. When approached by an ant they stood quite still, and raised the tail high in the air; the ants would not touch them, and when forced to seize them, dropped them again at once.

*Atemeles paradoxus*, Gr., was taken by Mr. Keys and myself at Whitsand Bay, with *Formica rufibarbis* var. *fusco-rufibarbis*, in May. This is the only *Formica* species it is found with. We did not take it again in September, when we were searching the nests of this ant; but no doubt it was in the *Myrmica* nests, as *Atemeles* appears to go from *Myrmica* to *Formica* nests about February, when the larvæ are bred, and in summer or autumn the newly-hatched beetles go from *Formica* to *Myrmica* nests to pass the winter. This has always been my experience.

*Lomechusa strumosa*, F., was rediscovered by me in this country, on May 25th, at Woking, with *Formica sanguinea* (*Ent. Record*, 1906, p. 159), more specimens were taken on the 29th, and again in September. This was, no doubt, the most sensational capture we have had with coleoptera in this country for years, moreover, the lifehistory of the beetle is of exceptional interest. It has been thoroughly worked out and described by Father Wasmann in many of his writings. The